

WHAT IS CLAIMED IS:

1. A hydraulic control apparatus for a vehicle, comprising:
 - an electric oil pump;
 - 5 a pump control portion which controls the electric oil pump;
 - a hydraulic circuit portion which supplies a hydraulic pressure from the electric oil pump to an actuator of a transaxle of the vehicle;
 - a hydraulic circuit control portion which outputs a control signal to the hydraulic circuit portion; and
 - 10 an oil pump rotation control portion which is provided in the pump control portion and which controls a rotational state of the electric oil pump according to a change in a control status of the hydraulic circuit control portion.
2. The hydraulic control apparatus for a vehicle according to claim 1,
 - 15 further comprising:
 - an operation state determining portion which determines an operation state of the vehicle, and
 - a hydraulic pressure determining portion which determines whether a hydraulic pressure in the hydraulic circuit portion of the vehicle needs to be in a low hydraulic pressure region or in a high hydraulic pressure region based on a result of determination made by the operation state determining portion, wherein the hydraulic circuit control portion computes the control signal based on the result of determination made by the operation state determining portion, and the oil pump rotation control portion controls a rotational speed of the electric oil pump based on a result of determination made by the hydraulic pressure determining portion.
 - 20
 - 25
3. The hydraulic control apparatus for a vehicle according to claim 2, wherein the hydraulic pressure determining portion determines that the hydraulic pressure in the hydraulic circuit portion needs to be in the low hydraulic pressure region when the vehicle is in a light load running state.
- 30
4. The hydraulic control apparatus for a vehicle according to claim 2, wherein the oil pump rotation control portion sets the rotational speed of the electric

oil pump to be in a low rotational speed region when it is determined as a result of determination made by the hydraulic pressure determining portion that the hydraulic pressure of the hydraulic circuit portion needs to be in the low hydraulic pressure region, and sets the rotational speed of the electric oil pump to be in a high rotational speed region with respect to the low rotational speed region when it is determined as a result of determination made by the hydraulic pressure determining portion that the hydraulic pressure of the hydraulic circuit portion needs to be in the high hydraulic pressure region.

5
10 5. The hydraulic control apparatus for a vehicle according to claim 4, further comprising:

 a rotation return portion which is provided in the oil pump rotation control portion, and which returns the rotational speed of the electric oil pump from the low rotational speed region to the high rotational speed region when a status of the hydraulic circuit control portion is switched to a control status for supplying a hydraulic pressure from the hydraulic circuit portion such that the actuator is driven.

15 6. The hydraulic control apparatus for a vehicle according to claim 5, wherein the oil pump rotation control portion returns the rotational speed of the oil pump from the low rotational speed region to the high rotational speed region when a driving amount of the actuator exceeds a predetermined value.

20 7. The hydraulic control apparatus for a vehicle according to claim 5, wherein the rotation return portion sets a rate of change of the rotational speed of the electric oil pump when the rotational speed returns from the low rotational speed region to the high rotational speed region to be larger than a rate of change of the rotational speed of the electric oil pump when the electric oil pump is in the high rotational seed region.

25 8. The hydraulic control apparatus for a vehicle according to claim 5, wherein the actuator is for a clutch mechanism which switches a power source for a drive wheel between an engine and a motor generator using the engagement of a clutch that is controlled by a hydraulic pressure.

9. The hydraulic control apparatus for a vehicle according to claim 8,
wherein when the status of the hydraulic circuit control portion is switched to a
control status in which a control signal for engaging the clutch is output to the
5 hydraulic circuit portion, the rotation return portion returns the rotational speed of the
electric oil pump from the low rotational speed region to the high rotational speed
region.

10. The hydraulic control apparatus for a vehicle according to claim 5,
10 wherein the actuator is for an automatic transmission including a shifting mechanism
in which shifting is performed using hydraulic pressure.

11. The hydraulic control apparatus for a vehicle according to claim 10,
wherein the automatic transmission is a belt type continuously variable transmission.

12. The hydraulic control apparatus for a vehicle according to claim 11,
wherein when the status of the hydraulic circuit control portion is switched to a
control status in which a control signal for changing a speed at which shifting is
performed in the belt type continuously variable transmission is output to the
15 hydraulic circuit portion, the rotation return portion returns the rotational speed of the
20 electric oil pump from the low rotational speed region to the high rotational speed
region.

13. The hydraulic control apparatus for a vehicle according to claim 11,
25 wherein when the status of the hydraulic circuit control apparatus is switched to a
control status in which a control signal for increasing a belt holding force of the belt
type continuously variable transmission is output to the hydraulic control portion, the
rotation return portion returns the rotational speed of the electric oil pump from the
low rotational speed are to the high rotational speed area.

14. The hydraulic control apparatus for a vehicle according to claim 11,
30 wherein when an absolute value of a speed at which shifting of the belt type
continuously variable transmission is performed is equal to or larger than a

predetermined value, the rotation return portion returns the rotational speed of the electric oil pump.

15 15. The hydraulic control apparatus for a vehicle according to claim 14,
wherein the hydraulic circuit control portion determines the speed at which shifting is
performed according to a speed at which a belt winding radius of a primary pulley of
the belt type continuously variable transmission changes.

10 16. A hydraulic control apparatus for a vehicle, comprising:
 an electric oil pump;
 a control portion for the electric oil pump;
 a hydraulic circuit portion which supplies a hydraulic pressure from
the electric oil pump to an actuator of a transaxle of the vehicle;
 a hydraulic circuit control portion which outputs a control signal to
15 the hydraulic circuit portion;
 an operation state determining portion which determines an operation
state of the vehicle,
 a hydraulic pressure determining portion which determines whether a
hydraulic pressure in the hydraulic circuit portion of the vehicle needs to be in a low
20 hydraulic pressure region or in a high hydraulic pressure region based on a result of
determination made by the operation state determining portion;
 an oil pump rotation control portion which controls a rotational state
of the electric oil pump based on a result of determination made by the hydraulic
pressure determining portion;
25 a rotation return portion which sets the rotational speed of the
electric oil pump to be in a low rotational speed region when it is determined as a
result of determination made by the hydraulic pressure determining portion that the
hydraulic pressure of the hydraulic circuit portion needs to be in the low hydraulic
pressure region, and sets the rotational speed of the electric oil pump to be in a higher
30 rotational speed region than the low rotational speed region when it is determined as a
result of determination made by the hydraulic pressure determining portion that the
hydraulic pressure of the hydraulic circuit portion needs to be in the high hydraulic
pressure region, and which returns the rotational speed of the electric oil pump from
the low rotational speed region to the high rotational speed region, wherein the

rotation return portion sets a rate of change of the rotational speed of the electric oil pump when the rotational speed returns from the low rotational speed region to the high rotational speed region to be larger than a rate of change of the rotational speed of the electric oil pump when the electric oil pump is in the high rotational speed region.

5

17. A control method of a hydraulic control apparatus for a vehicle, which comprises an electric oil pump; a hydraulic circuit portion which supplies a hydraulic pressure from the electric oil pump to an actuator of a transaxle of the vehicle; and a hydraulic circuit control portion which outputs a control signal to the hydraulic circuit portion; comprising the step of:

10

controlling a rotational state of the electric oil pump according to a change in a control status of the hydraulic circuit control portion.

15